

NUCLEAR SECURITY  
SCIENCE AND TECHNOLOGY CONSORTIUM

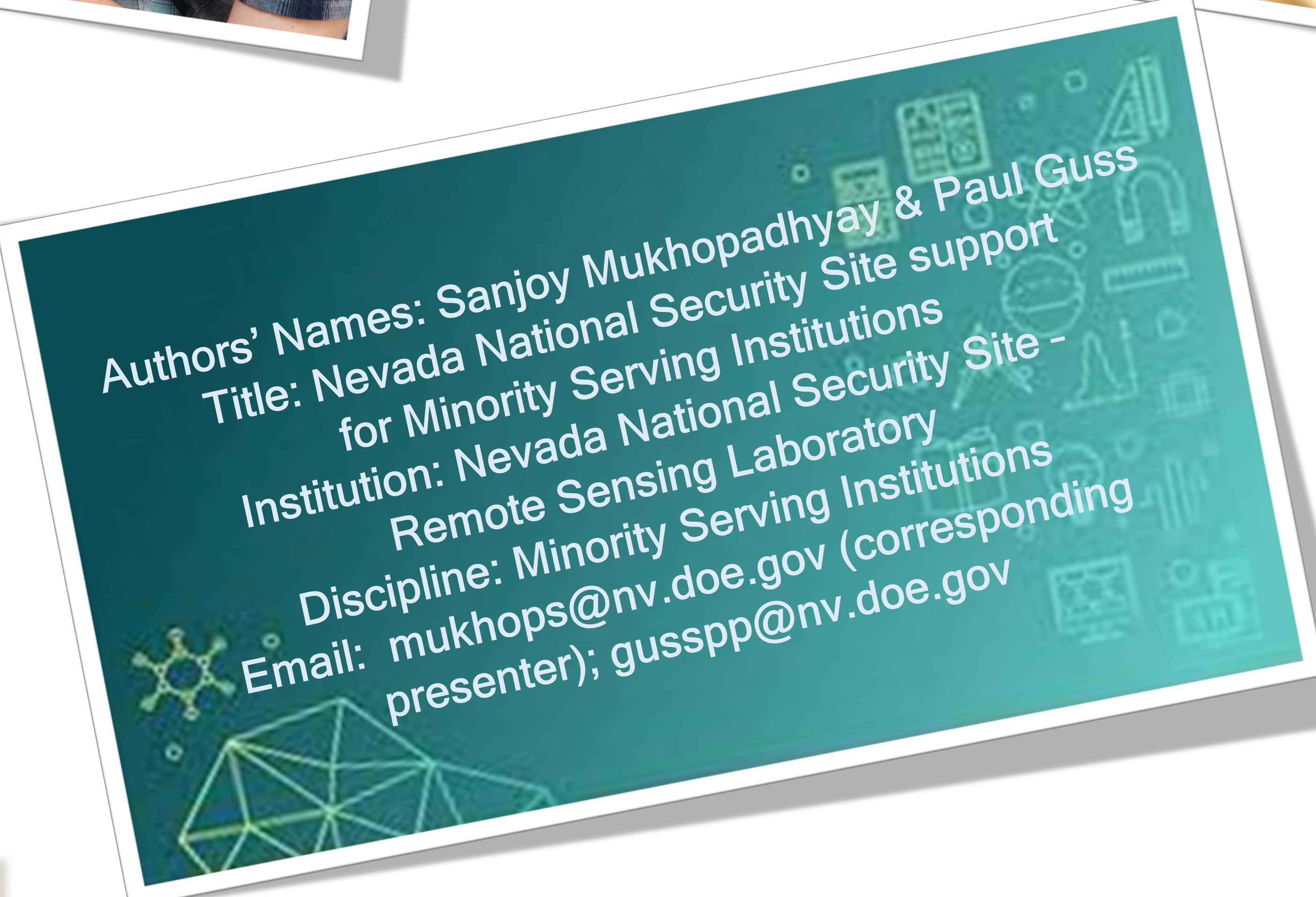
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The Nuclear Security Science and Technology Consortium (NSSTC) provides Science, Technology, Engineering, and Math (STEM), including Computer Science, students from minority-serving institution (MSI) partners with an opportunity to learn and receive advice from practicing science and technology professionals at Nevada National Security Site (NNSS) about forward-leaning, cutting-edge technologies related to radiation detection systems and materials informatics with the desired end state.



### Modern Direct Conversion Neutron Detection Materials

$\text{LiInSe}_2$  and  $\text{LiInP}_2\text{Se}_6$  are being actively pursued for direct neutron detection at room temperature because of their favorable properties and large thermal neutron cross section of  ${}^6\text{Li}$ . Both materials may be classified as medium-gap (around 2 eV) semiconductors having band structures and defect properties that allow moderate  $\mu\tau$  and large bulk resistivity.



A large number of selected topics are from proposals previously considered for the NNSS Site-Directed Research and Development program, namely

- fabrication of microfluidic chips and testing with nonradioactive surrogates,
- computational study of elpasolite scintillation detectors in active assay of special nuclear material (SNM),
- fast neutron gallium nitride scintillation experiments at the Los Alamos Neutron Science Center (LANSCE),
- compact muon scintillation detectors about the size of a cell phone,
- radiation sensors (CZT and CLYC sensors) integrated into unmanned aircraft system (UAS) platforms, and
- pursuing growth characterization of novel direct neutron conversion room temperature semiconductors.

